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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,929	10/18/2001	Janet Newman	10342-0010-999	4507

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EXAMINER
HO, ALLEN C

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applica
	10/042,929	NEWMAN ET AL.
	Examiner	Art Unit
	Allen C. Ho	2882

-- Th MAILING DATE of this communication appears on th cov r sh et with th correspondence addr ss --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "126" has been used to designate both an upstanding column and a beam stop. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 508 in Fig. 5. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

(1) Page 9, line 15, "128" should be replaced by --132--.

(2) Page 14, line 16, a space should be inserted after "4".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. The terms "high sensitivity" and "rapid readout" in claim 7 are relative terms which renders the claim indefinite. The terms "high sensitivity" and "rapid readout" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The specification fails to quantify these two terms.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 11-16, 19, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Tatsumi *et al.* (U. S. Patent No. 4,634,490).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: a crystal growth incubator (**4**) having opposing first and second sides; an x-ray system, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator; and an x-ray detector (**11**)

disposed adjacent to the second side of the crystal growth incubator, where the x-ray detector is configured to detect the presence of diffracted Laue spots from the single crystal grown in the crystal growing incubator. The method comprises the steps of: irradiating crystalline material in it *in-situ* growth environment with an x-ray beam; detecting a diffraction pattern from the crystalline material; screening the crystalline material for suitability based on the diffraction pattern (column 1, lines 66-68; column 2, lines 1-4); prior to the irradiating, determining the presence of the crystalline material in the *in-situ* growth environment (visual observation); prior to the irradiating, ascertaining and positioning the crystalline material and the x-ray beam relative to each other, such that the x-ray beam accurately aligns with the crystalline material (both are necessary in order to obtain diffraction pattern).

9. Claims 1, 2, 3, 11-16, 19, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Murayama (U. S. Patent No. 5,046,077).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: a crystal growth incubator (**6**) having opposing first and second sides; an x-ray system, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator; and an x-ray detector (**5**) disposed adjacent to the second side of the crystal growth incubator, where the x-ray detector is configured to detect the presence of diffracted Laue spots from the single crystal grown in the crystal growing incubator; a positioner (**8, 9, 11, 12**) that positions the incubator and the x-ray system relative to each other. The method comprises the steps of: irradiating crystalline material in it *in-situ* growth environment with an x-ray beam; detecting a diffraction pattern from the

crystalline material; screening the crystalline material for suitability based on the diffraction pattern; prior to the irradiating, determining the presence of the crystalline material in the *in-situ* growth environment (visual observation); prior to the irradiating, ascertaining and positioning the crystalline material and the x-ray beam relative to each other, such that the x-ray beam accurately aligns with the crystalline material (both are necessary in order to obtain diffraction pattern).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 1 above, and further in view of Fink *et al.* (U. S. Patent No. 5,359,640).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment comprising a crystal growth incubator (**4**).

However, Tatsumi *et al.* did not teach that the apparatus further comprising an imaging system disposed adjacent to the crystal incubator.

Fink *et al.* disclosed a micro-diffractometer that comprises an optical imaging system (LS and KA) for aligning the x-ray with a micro-sized sample. It is further taught that aligning the x-ray with the sample is a difficult and time-consuming process that requires trial and error due to the invisibility of the x-rays (column 1, lines 31-37).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an optical imaging system with the apparatus, since a person would be motivated to align the x-ray with the crystal by optical means prior to irradiating in order to speed up the alignment process.

12. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 1 above, and further in view of Stettner *et al.* (U. S. Patent No. 5,629,524).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising an x-ray detector (**11**) disposed adjacent to the second side of the crystal growth incubator, where the x-ray detector is configured to detect the presence of diffracted Laue spots from the single crystal grown in the crystal growing incubator.

However, Tatsumi *et al.* did not teach that the x-ray detector is a phosphor plate imaging system.

Stettner *et al.* disclosed a real-time phosphor plate (**43**) imaging system (column 1, lines 45-60) for use with x-ray crystallography. This image system provides high sensitivity (phosphor plate) and a rapid readout (CCD).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a real-time phosphor plate imaging system for detecting diffracted x-rays, since a person would be motivated to obtain a result in real time.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 1 above, and further in view of Cullity.

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator.

However, Tatsumi *et al.* did not teach that the x-ray source emits a monochromatic beam of x-rays consisting of CuKα radiation.

Cullity disclosed that CuKα radiation is generally the most useful among the characteristic radiations in x-ray diffraction.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ CuKα as the radiation in x-ray diffraction, since a person would be motivated to employ a widely available characteristic radiation in x-ray diffraction in order to reduce cost.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 1 above, and further in view of Dosho (U. S. Patent No. 6,285,736 B1).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator.

However, Tatsumi *et al.* did not teach that the x-ray source emits an x-ray beam with a focus size of 200 microns or less.

Dosho disclosed a micro-diffraction apparatus that is capable of producing a beam spot size of 100 μm or less (column 7, lines 1-2).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ an x-ray beam with a beam spot size of 100 μm or less, since a person would be motivated to avoid the possibility of collecting scattered x-rays from areas outside a micron-sized sample by matching the beam spot size with the size of the sample.

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 1 above, and further in view of Polichar *et al.* (U. S. Patent No. 6,205,199 B1).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Tatsumi *et al.* did not teach that the apparatus further comprising a transmitter that transmits information associated with the diffraction pattern to a remote location.

Polichar *et al.* disclosed an x-ray system that comprises a transmitter (modem, Ethernet) for transmitting data to remote locations for evaluation by experts who are not on site.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a transmitter for transmitting data to remote locations, since a person would be motivated to consult with experts at remote locations.

16. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 16 above.

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Tatsumi *et al.* did not teach storing the location of the crystalline material.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to store the location of the crystalline material, since a person would be motivated to automate the alignment procedure by storing the location of the crystalline material in a computer and program the computer to calculate the positions of the x-ray source and x-ray detector based on the location of the crystalline material.

17. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 20 above.

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Tatsumi *et al.* did not teach growing the crystalline material by a method selected from a group consisting of: a vapor diffusion method, a hang-drop method, a sitting drop method, a dialysis method, a microbatch method, and a gel crystal growth method.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform this method in any growth environment, since a person would be motivated to monitor the growth of a crystalline material in order perfect the growth process. Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to choose from among the known methods based solely on design choice absent any showing of criticality. The lack of criticality is demonstrated by applicant's claiming of a plurality of methods.

18. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claims 11 above, and further in view of Arnowitz *et al.* (U. S. Patent No. 6,468,346 B2).

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Tatsumi *et al.* did not teach performing this method in space.

Arnowitz *et al.* disclosed that space-grown crystals are of higher crystallographic perfection than earth-grown crystals (column 2, lines 14-17).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform this method in space, since a person would be motivated to grow crystals with fewer defects that are suitable for use in either practical applications or crystallography.

19. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tatsumi *et al.* (U. S. Patent No. 4,634,490) as applied to claim 11 above.

Tatsumi *et al.* disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Tatsumi *et al.* did not teach that the method further comprising determining whether the crystalline material is a protein crystal or a salt crystal.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine whether the crystalline material is a protein crystal or a salt crystal, since a person in the art would be able to make that determination given the x-ray diffraction pattern.

20. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 1 above, and further in view of Fink *et al.* (U. S. Patent No. 5,359,640).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment comprising a crystal growth incubator (**6**).

However, Murayama did not teach that the apparatus further comprising an imaging system disposed adjacent to the crystal incubator.

Fink *et al.* disclosed a micro-diffractometer that comprises an optical imaging system (LS and KA) for aligning the x-ray with a micro-sized sample. It is further taught that aligning the x-ray with the sample is a difficult and time-consuming process that requires trial and error due to the invisibility of the x-rays (column 1, lines 31-37).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an optical imaging system with the apparatus, since a person would be motivated to align the x-ray with the crystal by optical means prior to irradiating in order to speed up the alignment process.

21. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 1 above, and further in view of Stettner *et al.* (U. S. Patent No. 5,629,524).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising an x-ray detector (**5**) disposed adjacent to the second side of the crystal growth incubator, where the x-ray detector is configured to detect

the presence of diffracted Laue spots from the single crystal grown in the crystal growing incubator.

However, Tatsumi *et al.* did not teach that the x-ray detector is a phosphor plate imaging system.

Stettner *et al.* disclosed a real-time phosphor plate imaging system (column 1, lines 45-60) for use with x-ray crystallography. This phosphor plate image system provides high sensitivity (phosphor plate) and a rapid readout (CCD).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a real-time phosphor plate imaging system for detecting diffracted x-rays, since a person would be motivated to obtain a result in real time.

22. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 1 above, and further in view of Cullity.

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator.

However, Murayama did not teach that the x-ray source emits a monochromatic beam of x-rays consisting of CuKα radiation.

Cullity disclosed that CuKα radiation is generally the most useful among the characteristic radiations in x-ray diffraction.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ CuKα as the radiation in x-ray diffraction, since a person would

be motivated to employ a widely available characteristic radiation in x-ray diffraction in order to reduce cost.

23. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 1 above, and further in view of Dosho (U. S. Patent No. 6,285,736 B1).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment, comprising: an x-ray source (**1**) disposed adjacent to the first side of the crystal growth incubator, where the x-ray source is configured to irradiate single crystal grown in the crystal growing incubator.

However, Murayama did not teach that the x-ray source emits an x-ray beam with a focus size of 200 microns or less.

Dosho disclosed a micro-diffraction apparatus that is capable of producing a beam spot size of 100 μm or less (column 7, lines 1-2).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ an x-ray beam with a beam spot size of 100 μm or less, since a person would be motivated to avoid the possibility of collecting scattered x-rays from areas outside a micron-sized sample by matching the beam spot size with the size of the sample.

24. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 1 above, and further in view of Polichar *et al.* (U. S. Patent No. 6,205,199 B1).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Murayama did not teach that the apparatus further comprising a transmitter that transmits information associated with the diffraction pattern to a remote location.

Polichar *et al.* disclosed an x-ray system that comprises a transmitter (modem, Ethernet) for transmitting data to remote locations for evaluation by experts who are not on site.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a transmitter for transmitting data to remote locations, since a person would be motivated to consult with experts at remote locations.

25. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 16 above.

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Murayama did not teach storing the location of the crystalline material.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to store the location of the crystalline material, since a person would be motivated to automate the alignment procedure by storing the location of the crystalline material in a computer and program the computer to calculate the positions of the x-ray source and x-ray detector based on the location of the crystalline material.

26. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 20 above.

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Murayama did not teach growing the crystalline material by a method selected from a group consisting of: a vapor diffusion method, a hang-drop method, a sitting drop method, a dialysis method, a microbatch method, and a gel crystal growth method.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform this method in any growth environment, since a person would be motivated to monitor the growth of a crystalline material in order perfect the growth process. Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to choose from among the known methods based solely on design choice absent any showing of criticality. The lack of criticality is demonstrated by applicant's claiming of a plurality of methods.

27. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 11 above, and further in view of Arnowitz *et al.* (U. S. Patent No. 6,468,346 B2).

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Murayama did not teach performing this method in space.

Arnowitz *et al.* disclosed that space-grown crystals are of higher crystallographic perfection than earth-grown crystals (column 2, lines 14-17).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform this method in space, since a person would be motivated to grow crystals with fewer defects that are suitable for use in either practical applications or crystallography.

28. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 11 above.

Murayama disclosed an apparatus and method for detecting the presence of crystalline material in its *in-situ* growth environment.

However, Murayama did not teach that the method further comprising determining whether the crystalline material is a protein crystal or a salt crystal.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine whether the crystalline material is a protein crystal or a salt crystal, since a person in the art would be able to make that determination given the x-ray diffraction pattern.

29. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077).

Murayama disclosed a method of screening for crystalline material in its *in-situ* growth environment, the method comprising the steps of: growing a single crystal in a crystal growing incubator (**6**); placing the crystal incubator into a positioner (**8, 9, 11, 12**); determining the presence of the crystal in the crystal growing incubator (observing diffracted x-rays); ascertaining the location of the crystal in the crystal growing incubator (on a specimen stand); positioning the crystal growing incubator and an x-ray source (**1**) relative to each other based on the location of the crystal such that an x-ray beam emitted from the x-ray source accurately aligns with the crystal (inherent in order to obtain diffraction pattern); irradiating the crystal with the x-ray beam; detecting with an x-ray detector (**5**) a diffraction pattern from the crystal; and screening the crystal for suitability based on the diffraction pattern.

However, Murayama did not teach that the method comprises the steps of storing the location of the crystal.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to store the location of the crystal, since a person would be motivated to automate the alignment procedure by storing the location of the crystal in a computer and program the computer to calculate the positions of the x-ray source and x-ray detector based on the location of the crystal.

30. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 25 above, and further in view of Fink *et al.* (U. S. Patent No. 5,359,640).

Murayama disclosed a method of screening for crystalline material in its *in-situ* growth environment.

However, Murayama did not teach re-positioning the crystalline material relative to the x-ray beam while the x-ray beam remains stationary.

Fink *et al.* disclosed an x-ray micro-diffractometer comprising an XYZ sample stage.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to re-position the crystalline material relative to a stationary x-ray beam, since a person would be motivated to study the surface morphology of the crystalline material while keeping the diffraction geometry constant.

31. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 25 above, and further in view of Arnowitz *et al.* (U. S. Patent No. 6,468,346 B2).

Murayama disclosed a method of screening for crystalline material in its *in-situ* growth environment.

However, Murayama did not teach performing this method in space.

Arnowitz *et al.* disclosed that space-grown crystals are of higher crystallographic perfection than earth-grown crystals (column 2, lines 14-17).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform this method in space, since a person would be motivated to grow crystals with fewer defects that are suitable for use in either practical applications or crystallography.

32. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama (U. S. Patent No. 5,046,077) as applied to claim 25 above.

Murayama disclosed a method of screening for crystalline material in its *in-situ* growth environment.

However, Murayama did not teach determining whether the crystalline material is a protein crystal or a salt crystal.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine whether the crystalline material is a protein crystal or a salt crystal, since a person in the art would be able to make that determination given the x-ray diffraction pattern.

Conclusion

33. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(1) He *et al.* (U. S. Patent No. 6,163,592) describe an x-ray diffraction measurement system comprising a beamstop.

(2) Prevey, III *et al.* (U. S. Patent No. 5,737,385) describe an automated system for use in the determination of substance material property by x-ray diffraction *in-situ*.

(3) Okumura *et al.* (U. S. Patent No. 5,636,258) describe *in-situ* temperature measurement using x-ray diffraction.

(4) Blake *et al.* (U. S. Patent No. 5,491,738) describe an x-ray diffraction apparatus in a forward-scattered geometry.

(5) Fawcett *et al.* (U. S. Patent No. 4,821,303) describe a combined thermal analyzer and x-ray diffractometer.

(6) Flannery *et al.* (U. S. Patent No. 3,992,624) describe an apparatus and method of x-ray topography at cryogenic temperature.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached at (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Allen C. Ho
Examiner
Art Unit 2882

ACH
November 17, 2002

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